Remarks

Summary

Claims 1-2 were pending. Claim 1 has been amended Claim 1, Claim 2 cancelled and Claims 3-9 added. The amendments to the claims and the new claims are supported by the specification.

Objection to Drawings

In the Office Action of June 9, 2001, the Draftsman objected to Fig. 2 under 37 CFR 1.84(i) for having words that do not appear on a horizontal, left-to-right fashion when the page is either upright or turned so that the top becomes the right side. Applicant has enclosed a corrected version of Fig. 2 with corrections marked in red and requests the Examiner approve the corrections. Applicant will submit formal drawings upon receiving a Notice of Allowance.

Amendments to Specification

Applicant has amended the text of the specification to adjust a point of confusion in the original application. In the original application, the circuit used to apply an intermediate voltage shown in Fig. 1 was described as being associated with each of the color-difference signal Pr and the color-difference signal Pb as well as the luminance signal (Y). Applicant has amended the specification to recite that a similar circuit associated with the luminance signal does not specifically involve an intermediate voltage and thus does not contain the resistors 5,6 or buffer amplifier 7.

Rejection of Claims

In the Office Action, the Examiner rejected Claims 1-2 under 35 U.S.C. § 102(b) as being anticipated by Yamagishi (U.S. Patent 4,642,694). Applicant has amended Claim 1, cancelled Claim 2 and added Claims 3-9. Applicant submits that amended Claim 1 and Claims 3-9 are patentable over Yamagishi.

Amended Claim 1 recites a liquid crystal display having a plurality of converters that convert a luminance signal and two color-difference signals of an input video signal into digital signals. Setting circuits set the magnitudes of reference voltage ranges to determine identical upper and lower limit voltages of the digital signals. Each setting circuit includes two power supplies. The first power supply is a

variable power supply connected to one of the converters, the variable power supply determines the upper limit voltage that defines a maximum value of the input signal to the converter, which corresponds to a maximum value of the digital signal outputted from the converter. The variable power supply permits a contrast adjustment of picture images. The second power supply determines the lower limit voltage that defines a minimum value of the input signal to the converter, which corresponds to a minimum value of the digital signal outputted from the converter. Intermediate voltage circuits set intermediate voltages between the upper limit voltages and the lower limit voltages into the converters corresponding to the two color-difference signals.

The arrangement of amended Claim 1 automatically varies the contrast adjustment and accurate picture reproduction as the signals change by individually adjusting the reference voltage ranges for the color-difference signals in the liquid crystal display to be identical, rather than merely varying the amplification factor of the luminance signal thereby causing variations in color display. In addition, external noise that deteriorates the picture quality is decreased as the circuit construction is relatively simple.

Yamagishi discloses an arrangement to improve contrast by automatically changing the upper and lower reference potentials to the A/D converter when an appropriate counter falls outside of a specified region when near white and black regions. The counters count field units in which an applied signal falls either above the upper reference potential or below the lower reference potential. Thus, Yamagishi neither anticipates or discloses setting circuits that each includes two power supplies, one of which is a variable power supply. Nor does Yamagishi anticipate or disclose that the variable power supply specifically determines the upper limit voltage and which permits a contrast adjustment of picture images. In addition, Yamagishi does not anticipate or disclose simple intermediate voltage circuits that set intermediate voltages between the upper limit voltages and the lower limit voltages. Furthermore, Yamagishi does not anticipate or disclose that the intermediate voltage circuits are specifically associated with the converters corresponding to the two color-difference signals.

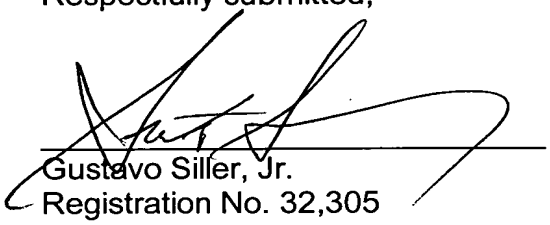
For at least these reasons, Yamagishi does not anticipate or disclose the arrangement of amended Claim 1. Thus, amended Claim 1 and new Claims 3-5 are patentable over Yamagishi. For similar reasons, the prior art cited by the Examiner

does not anticipate or disclose the arrangement of new Claim 6, and thus new Claims 6-9 are patentable over the prior art cited by the Examiner.

Conclusion

In view of the amendments and arguments above, Applicants respectfully submit that all of the pending claims are in condition for allowance and seek an early allowance thereof. If for any reason the Examiner is unable to allow the application in the next Office Action and believes that a telephone interview would be helpful to resolve any remaining issues, he is respectfully requested to contact the undersigned attorneys.

Respectfully submitted,



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APPENDIX A
Serial No. 09/378,519
Liquid Crystal Display
Fumiaki Inage

In the Specification

Please amend the paragraph beginning on line 8 of page 4 as follows:

The variable resistor 51 is normally a ~~simi~~semi-fixed type, and to vary the resistance will vary the amplification of the amplifier 50.

Please amend the paragraph beginning on line 9 of page 10 as follows:

In Fig. 1 is a block diagram to illustrate the basic construction of a liquid crystal driving circuit relating to the liquid crystal display according to ~~the~~ one embodiment of this invention. The liquid crystal driving circuit shown in Fig. 1 is provided to each of ~~the luminance signal (Y),~~ the color-difference signal Pr~~,~~ and the color-difference signal Pb (these signals constitute the high vision signal). The luminance signal (Y) is amplified by a similar circuit that does not contain the resistors 5,6 or buffer amplifier 7.

Please amend the paragraph beginning on line 22 of page 12 as follows:

Thus, ~~the luminance signal (Y),~~ the color-difference signal Pr~~,~~ and the color-difference signal Pb inputted to the amplifier 1 are amplified by the amplifier 1~~,~~ and digitized by the upper limit voltage and intermediate voltage that are newly set. Correspondingly, the luminance signal is amplified by a similar amplifier 1 and digitized by the upper and lower limit voltages, as the circuit that sets the intermediate voltage is not included.

In the Claims

Please amend Claim 1 as follows:

1. (Amended) A liquid crystal display, comprising:

~~conversion means~~a plurality of converters that convert a luminance signal and two color-difference signals of an input video signal ~~each~~ into digital

signals, ~~in correspondence with the respective signals, and~~ each digital signal corresponding to one of the luminance and color-difference signals;

a plurality of setting ~~means~~ circuits that sets magnitudes of reference voltage ranges to determine upper limit voltages and lower limit voltages of the digital signals to be identical ~~to each of these conversion means~~ in each of the converters, each setting circuit including:

a variable power supply connected to one of the converters, the variable power supply to determine the upper limit voltage that defines a maximum value of the input signal to said one of the converters corresponding to a maximum value of the digital signal outputted from said one of the converters, the variable power supply to permit a contrast adjustment of picture images, and

a second power supply connected to said one of the converters, the second power supply to determine the lower limit voltage that defines a minimum value of the input signal to said one of the converters corresponding to a minimum value of the digital signal outputted from said one of the converters; and

a plurality of intermediate voltage circuits that set intermediate voltages between the upper limit voltages and the lower limit voltages, the intermediate voltage circuits to input the intermediate voltages into the converters corresponding to said two color-difference signals.